on by the waves but the damage must be made up as fast as it occurs—probably for a year or two the breakwater must be watched and stones must be in readiness to be placed where damage occurs.

End to be strengthened.—It is impossible to know beforehand to what extent the waves may flatten down the slopes of the stone at the end, where they act with the greatest violence but even when the end is completed with the heaviest stone procurable it must be watched for some time, and subsidence of the stone made good. For the same reason it would not be advisable at present to erect a timber lighthouse on the end until the stone is thoroughly consolidated. The top of this breakwater is about 18ft. above high-water spring-tides.

East Breakwater.—The east breakwater has been carried out as far as intended by the original design, the first 2,500ft. as a tip bank and the remainder from staging. The stonework of this last part is intended to stand at half-tide level, with the object of letting floods from the river pass over it. This breakwater has not such heavy stone on it as the west one, still there is no appearance of any damage except that, at the end, the stone is liable in rough weather to be cast up in heaps. Heavy stone is now being placed round the end, and for some distance from the end on the sides. In one part the work is yet too low and it is intended to raise this to the right height with heavy stone. The east breakwater is not subject to such rough treatment by the waves as the west, and, the end being made secure, it is perfectly safe. It is liable, however, to have the sand below it on the river side scoured out, and keeps settling down on that side. This will need to be made up as it settles, and with this object, and to repair any possible damage, the staging must be maintained for a year or two at least.

Staging to be maintained.—The maintenance of this staging may cause some trouble and expense, but to what extent it is not possible to determine. The piles are not, as in the west breakwater buried up in stone, but stand in the water They are, therefore, pretty certain to be eaten by sea-worms, and it would be difficult to see how long they will remain safe under this damage. The piles are also liable to be knocked down by drift trees, brought down by floods, beating against them with the waves. It was supposed to be from this cause that a number of bays of the staging fell down during a gale in August, 1890.

Drift Trees.—It would appear that the end of the breakwater is the place where the piles are most liable to be knocked down by drift trees, and, if a tree knocked down one pile, the waves dashing the beams and rails about would soon demolish many bays of the staging.

End to be raised.—Your Engineer suggests that at the end the stonework be raised up so as to form a mound 8ft. or so above high water This would effectually protect the piles, while it would close very little of the waterway intended to flow over the low level of the breakwater, and I would recommend this elevated end to be carried out with heavy rock. At a distance of 2 or 3 chains from the end the waves do not strike the work with much violence, and your Engineer intends to cover this distance with heavy rock, which, with a strong end, will make the whole work safe. The west breakwater to this date contains 645,000 tons of stone, and the east 232,000 tons.

Quarries.—The total quantity of stone taken out of the quarries to date is 877,000 tons. Of this, 227,000 tons is from the limestone, and the remainder from the granite quarries.

Limestone.—The limestone quarry is now exhausted, and there is no further need of the permanent-way on the road, which may be lifted to be used at the training-wall in the river

Granite.—The granite quarry comprises the high level, at a height of about 120ft. above the sea-level, and the long range of low-level quarries extending for nearly a mile along the beach, to which the railway from the high level descends at a gradient of 1 in 40. The low-level quarries, which originally showed a grand face of rock, have proved most disappointing and unsatisfactory, from the great amount of soft disintegrated stone which had to be stripped and removed to get at the hard and sound patches. It is therefore fortunate that the breakwaters are just about completed when these quarries show signs of exhaustion. There is still some stone to be got from them, but the quantity and quality is now uncertain.

High Level.—It is therefore satisfactory to know that there is a considerable supply of fine stone, the finest, indeed, that has yet been quarried, on the high-level quarry, and your Engineer is fully alive to the importance of taking care that this stone is not wasted or broken up into small sizes.

Road to It.—The access to this high-level quarry has been laid out by a line from the main line, rising at a gradient of 1 in 20 to the base of the great blocks and ridges of stone. The position of this line is very suitable for the quarry, provided the hard stone does not extend down to any great depth below the level of the line, of which there is no evidence at present, as the base on which the hard stone rests appears to be soft granite. The road up to this quarry had cost about £1,150, and if, as is estimated, the quantity of stone amounts to from 50,000 to 80,000 tons, it is certainly worth the expense of getting but in fact, considering the state of the low-level quarries, it is indispensable that this high-level stone should be procured to finish off the work.

Quantity to finish.—Your Engineer estimates that about 60,000 tons of first-class stone is now required to complete the breakwaters, and there will be no difficulty in getting this quantity from the high-level quarry, with perhaps a small remainder from the low level. There is, of course, great abundance of smaller stone to be had for the purpose of forming the training-walls, for pitching the river-banks, and the slopes of the proposed ship-basin. In the process of quarrying for